

# Extending the IC framework to paralympic elite athletes: the case of Bebe Vio

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## Abstract

**Purpose** – The aim of this paper is to apply the intellectual capital (IC) framework proposed by Aprile *et al.* to other elite athletes in order to analyze the usefulness of this framework. More specifically, it will be tested on Bebe Vio, a professional Italian wheelchair fencer.

**Design/methodology/approach** – To test the applicability of the IC framework, this paper uses the proposed IC components of natural capital, sports capital and media capital, using primary and secondary data related to the case study of Bebe Vio.

**Findings** – The results suggest that the proposed IC framework is also applicable to other athletes. Furthermore, the three original dimensions of the framework could be expanded. “Passion” (assigned to natural capital), “Family” (especially parents, assigned to sports capital) and “Charitable activities” (added to media capital), were included as further relevant element in determining the IC capital of professional athletes.

**Research limitations/implications** – The framework has so far focused specifically on professional athletes. However, it should also be tested on other individuals whose capital can also be largely explained by intangible resources.

**Practical implications** – The proposed IC framework can help different types of elite athletes and their managers to better understand how intangible capital can be built and managed throughout their careers.

**Social implications** – This research contributes to a more inclusive approach when it comes to considering people who, despite significant difficulties and challenges, dedicate themselves to professional sports and can thus serve as role models for other people.

**Originality/value** – In this work, a new IC framework specifically developed for elite athletes, was tested and successfully applied to elite athletes with disabilities, thus contributing to the theoretical further development of this framework.

**Keywords** Intellectual capital, Reputation, Paralympic elite athletes, Athletes with disabilities, Sports, Media capital

**Paper type** Research article

## 1. Introduction

In this paper, we apply the Intellectual Capital (IC) framework for elite athletes developed by Aprile *et al.* (2022) to the Paralympic champion Beatrice Maria Adelaide Marzia Vio Grandis (hereinafter referred to as Bebe Vio or Bebe), an Italian elite athlete in wheelchair fencing, to investigate whether this framework, in its current form, is also applicable to Paralympic elite athletes or whether it needs to be further developed to cover different types of professional athletes. The analyzed framework takes into account the emerging research interests regarding

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sports and elite athletes (Hextrum *et al.*, 2025). As far as the latter is concerned, these athletes in particular possess an IC that enables them to generate considerable financial capital not only for themselves but also for their immediate environment throughout their careers (Mijs, 2022; Puspitasari *et al.*, 2019; Wicker *et al.*, 2012), making them an interesting subject of investigation. By focussing on elite athletes, Aprile *et al.* (2022) have made an attempt to extend the application of IC frameworks, which typically focus on organizations, industries or countries (Pedro *et al.*, 2018), to individuals (Alppivuori and Kianto, 2025). To capture the IC of elite athletes, the above-mentioned framework considers three specific dimensions: natural capital (NaC), sports capital (SpC), and media capital (MeC). These dimensions were developed by the authors to capture the specific characteristics of “intangibles” that are not covered by the original three IC dimensions—human capital (HC), structural capital (SC) and relational capital (RC)—particularly with regard to athletes.

A review of existing studies reveals that elite athletes with disabilities are underrepresented in the IC literature, despite their successes both on and off the sporting field (Dehghansai *et al.*, 2017a; De Rycke and De Bosscher, 2019; Hu *et al.*, 2023). Although IC is recognized as a key factor for professional development, there is little evidence of its precise role in promoting the sports careers of people with disabilities (Dehghansai *et al.*, 2017b). Finally, although there are already many studies on IC, these mainly focus on organizations (e.g. Brescia *et al.*, 2025; Pulido-López and López-Salazar, 2025), which underscores the need for further research that focuses on the individual. By adopting an individual-centred perspective on IC and arguing that IC determines and supports the successful development and maintenance of an athlete’s career, our work aims to address these shortcomings in the existing IC literature.

The overall aim of this paper is to advance existing research in the field of IC frameworks and their applications. This aim will be achieved by analyzing the IC framework recently developed by Aprile *et al.* (2022), which is specifically designed for elite athletes. We are interested in testing the generalizability and robustness of this framework by applying it to elite athletes with disabilities. In addition, and no less important, we aim to contribute to greater diversity and inclusion in the social sciences in general and particularly in management and business research.

The remainder of this paper is structured as follows. First, we present the relevant literature on elite athletes with disability and link it to the current IC framework for elite athletes. Next, we will explain the methodology adopted in this study, and present the application of the IC framework to Bebe Vio. Finally, we present the discussion and conclusions.

## 2. Literature background

### 2.1 The context: athletes with disability and IC perspective

Research into elite athletes has intensified over the years, given the impact and influence of these individuals in various areas of social life (De Rycke and De Bosscher, 2019; Guinto and Ang, 2025; Su *et al.*, 2020; Wylleman and Rosier, 2016). Elite athletes have proven that they are capable of generating enormous incomes, from which not only the athletes themselves but also their environment benefit (Dixon, 2021; Puspitasari *et al.*, 2019). The IC of these individuals is a relevant factor from the beginning to the end of their careers, and the more successful the athletes are, the higher their IC (Aprile *et al.*, 2022; Esh *et al.*, 2024).

There are several studies that have focused either on athletes with disabilities and their respective areas of expertise (Lowry *et al.*, 2022; Rees *et al.*, 2019) or on Paralympic athletes and elite athletes with disabilities (De Cruz *et al.*, 2019; Kirk *et al.*, 2021; Purdue and Howe, 2016).

In recent years, research examining the role of IC in the sports sector has increased (Lardo *et al.*, 2017; Shareef and Davey, 2005; Vitolla *et al.*, 2022). In the context of sports organizations, Occhipinti (2022) emphasizes, for example, the role of IC in professional sports organizations, where the skills of the players (HC), the identity of the club (SC) and the relationships with stakeholders (RC) are responsible for the value creation of these

organizations. Similarly, [Leitão and Baptista \(2019\)](#) demonstrated that HC (expressed in terms of league ranking and salaries) and organizational capital (measured by gross profit) increase the brand value of English Premier League clubs, while excessive debt undermines the RC of the clubs.

With regard to athletes with disabilities, a particular focus has been placed on media presence and brand building ([Hu et al., 2023](#)). These studies have highlighted the role of the media and narrative construction in shaping the identity and market value of athletes. [Hu et al. \(2023\)](#), for example, investigated the marketability of elite athletes with disabilities from the perspective of agents, utilizing the Model of Athlete Brand Image (MABI). Their findings emphasize storytelling, social media engagement and advocacy as key strategies for building authentic, consistent brands that go beyond traditional sports narratives. Agents use compelling personal stories, outstanding athletic achievements and an appealing lifestyle to overcome obstacles such as limited media presence and stereotypical perceptions. It is argued that this approach not only improves sponsorship opportunities but also promotes diversity and inclusion. It shows how media capital can be strategically mobilized to empower marginalized athletes. However, the portrayal of athletes with disabilities in the media continues to be challenging. In their study, [Rees et al. \(2019\)](#) identified persistent inequalities in media representation, gender bias and stereotypical portrayals that favour “super ripple” and medicalized narratives over athletic achievements.

Media aspects of these athletes have also been analyzed ([Brittain, 2017](#); [Howe, 2008](#); [Hilgemberg, 2024](#); [Öztürk, 2025](#)). Media and digital marketing have been identified as effective tools for developing the relational capital of athletes with disabilities, with social networks providing platforms for personal storytelling, audience engagement, and strengthening personal branding ([Abeza et al., 2013](#); [Ballouli and Hutchinson, 2012](#); [Geurin, 2017](#); [Hambrick and Kang, 2015](#); [Kunkel and Biscaia, 2020](#); [Parmentier and Fischer, 2012](#); [Su et al., 2020](#)). Moreover, charitable activities and social support contribute to expanding athletes’ social networks and strengthening their social standing ([Kunkel et al., 2020](#)). The importance of these forms of capital for brand building and attracting sponsors and new target groups should be particularly emphasized.

An analysis of the Instagram stories of Turkish athletes by [Öztürk \(2025\)](#) showed that they use the platforms to redefine their identity and challenge stereotypes, even though gender inequalities still persist. Furthermore, the study by [Burton et al. \(2024\)](#) on financial support from users during the 2018 Paralympic Games revealed limited media coverage and low spectator interest, underscoring the need for long-term investments to improve the economic situation of athletes with disabilities. Therefore, more in-depth research—particularly in Paralympic sports—is essential to analyze the interplay of abilities, support networks, and structural factors.

The media aspects are primarily driven by two world-renowned champions: Oscar Pistorius ([Carlin, 2014](#); [Pistorious and Polo, 2011](#); [Smith, 2015](#); [Wolbring and Tynedal, 2013](#)) and Alex Zanardi ([Fuller, 2022](#); [McNamee, 2017](#)). Pistorius is a former South African professional sprinter who competed in both the Paralympic and Olympic games. After becoming a Paralympic champion, Pistorius faced restrictions from the International Association of Athletics Federations (IAAF), which opposed the possibility of an athlete with prosthetic legs competing in events for able-bodied athletes, fearing that such prostheses could provide a performance advantage ([Edwards, 2013](#); [Jones and Wilson, 2009](#); [Norman and Moola, 2011](#)). Because Pistorius won this legal battle ([Marcellini et al., 2012](#)), he was able to participate to the 2011 World Athletics Championships, becoming the first amputee to win a medal in a competition for able-bodied athletes. The following year, when he competed in the 2012 Summer Olympics, Pistorius was the first double amputee to achieve this. His level of notoriety was further increased by a dramatic event, as he was involved in the murder of his girlfriend, which largely ended his career ([Biber, 2019](#)). Another important and famous athlete is Alessandro Zandardi ([Bonesso et al., 2020](#); [Fuller, 2022](#); [McNamee, 2017](#)), who is generally known by the shortened name Alex ([Arrigoni, 2021](#)). He was a champion racing driver (among

other things, he competed in Formula One) and is also famous in the USA, where he competed in the Champ Car series for several years. Following a serious accident in 2001, both of his legs had to be amputated. Less than two years after the accident, he returned to racing, but he owes his fame to his activities as a Paralympic handcyclist athlete. He became a Paralympic champion in London in 2012 and in Rio de Janeiro in 2016 (and also won several world championships). His great mental strength, his generosity—he participated in numerous charitable initiatives—and his zest for life, as well as his infectious humour, along with his sporting achievements in various disciplines (including the Ironman), made him a hero. His sporting career ended in 2020 due to another serious accident during a charity competition. In a publication (Zanardi and Gasparini, 2019), Zanardi emphasized the importance of passion for success.

Another relevant aspect analyzed in the literature is the role of parents and family in the development of elite athletes with disabilities. Parents prove to be a central, yet still insufficiently researched, dimension in the development of athletes with disabilities. Coates and Howe (2023) highlighted the multifaceted roles that parents—as caregivers, coaches, and organizers—play in overcoming barriers within the sports and education systems. Anderson (2009) and Carter *et al.* (2014) further emphasized the role and responsibility of parents in disability sports in general. These roles not only empower their children but also alleviate the parents' own concerns regarding future uncertainties through supportive networks. A study by Rodriguez Macias *et al.* (2022) highlighted that support from coaches and families, as well as psychological factors such as self-esteem, motivation, and stress management, significantly influences the performance of these athletes. Conversely, challenges such as financial constraints, limited access to sports facilities, and underrepresentation in the media continue to be the biggest barriers to their development.

This familiar involvement, combined with media presence and social capital, particularly among athletes with disabilities, can foster opportunities for economic, cultural, and social development through sport. This aligns with Ratten's (2015) argument regarding the entrepreneurial potential that arises from the IC of athletes. Taken together, these findings stress that IC — especially in relation to talent development, infrastructure improvement, and structural and relational support — plays a pivotal role in the sustained success of elite athletes with disabilities.

### 3. The IC framework of elite athletes

As explained in the introduction, this paper is based on the theoretical IC framework for elite athletes (Aprile *et al.*, 2022) and its transferability to other athletes. This framework is based on the assumption that the IC of an elite athlete is the sum of three capital dimensions: Natural capital (NaC) (i.e. the innate talents and physical attributes of the athlete), Sports capital (SpC) (i.e. the athlete's competitive achievements and economic rewards), and Media capital (MeC) (i.e. the athlete's public image and media-driven reputation).

#### 3.1 Natural capital

NaC can be described as the natural attributes of an athlete. This capital can lead to victories, outstanding performances on the field, and fame off the field. In the proposed model, NaC is primarily influenced by technical skills and aesthetic qualities. Both elements represent natural talents that athletes must hone through training activities to reach an elite level. They can be divided into “innate” and an “acquired” component of talent (Stambulova *et al.*, 2015). NaC, therefore, represents a prerequisite for the development of the other two dimensions of capital.

#### 3.2 Sports capital

The second element of the IC framework is SpC. SpC is a form of HC and SC that manifests itself specifically in sporting and economic results. It can be measured from two perspectives: sporting success and economic benefit. Therefore, there is a connection between these two

aspects. In the business model of athletes, sporting success leads to economic success. The measurement of this dimension of capital depends on the sport. It can be measured by the number of victories, their relevance (e.g. Olympic Games), the records set, and whether victories were achieved in individual competitions or season-long competitions. The more victories athletes achieve on the field, the higher the value of this capital dimension and thus their total IC. [Arai et al. \(2014\)](#), drawing on [Richelieu and Pons \(2006\)](#), explained that victories do not necessarily have to be continuous successes, but can also include exceptional performances that define the athletes' brand as competitive.

### 3.3 Media capital

Athletes do not have a direct relationship with their "customers"; rather, the relationship is more general and predominantly indirect. Although the media landscape has a connection to social media ([Lardo et al., 2017](#)), it is much more general and encompasses various media forms ([Aprile et al., 2022](#)). At the core of MeC, alongside athletic achievements, lies the public's reaction to the personality and popularity of athletes. MeC is influenced by athletes' presence in mass media such as television, radio, newspapers, and social networks. To further develop their MeC, athletes must differentiate themselves within the global sports landscape ([Ratten, 2015](#)) – a process similar to that of products or companies. In this context, the personal branding of athletes via social media has increasingly attracted academic attention. Studies by [Abeza et al. \(2017\)](#) and [Su et al. \(2020\)](#) showed how athletes strategically use these platforms to engage with their audience, promote products, and improve their public image. Their findings suggest that content related to athletic performance, team presence, and high visual quality tends to generate stronger user engagement. Furthermore, the strategic use of social media facilitates the expansion of athletes' digital influence. This trend aligns with the framework of [Seno and Lukas \(2007\)](#) on referral marketing, which conceives of the relationship between athlete and brand as a strategic partnership. Further research by [Carlson and Donavan \(2013\)](#), [Parmentier and Fischer \(2012\)](#), and [Summers and Morgan \(2008\)](#) emphasizes the concept of personal branding and its potential for the post-athletic era. They suggest that athletes can leverage their social and media capital to gain a competitive edge, launch entrepreneurial ventures, and shape their long-term careers. Overall, social media in the digital age has evolved into a strategic environment that provides athletes with a powerful platform to strengthen their personal brand and maximize the value of their intellectual capital ([O'Hallam et al., 2019](#)).

The conceptual model of athlete brand image proposed by [Arai et al. \(2014\)](#) emphasizes three key dimensions: athletic performance, attractive appearance and marketable lifestyle. This allows for an analysis that considers not only athletic attributes and achievements but also off-field aspects, particularly those related to marketable lifestyle. An athlete's physical physique and associated attractiveness can influence both athletic and non-athletic performance. Furthermore, MeC is influenced by the athlete's charisma. This charisma can help an athlete gain recognition beyond the realm of sport.

MeC leads to an increase in athletes' earnings through the use of public relations, likeability, empathy, appearance, relationships with journalists, social media use, romantic relationships, sponsors, lifestyle, and team selection. This dimension is generally related to competitive results, institutional activities, other activities, and leisure pursuits.

## 4. Methodology

To achieve the aim of this research, we used the case study methodology ([Miles and Huberman, 1994](#); [Yin, 1994, 2003](#); [Stake, 1995](#)). It "is an approach to research that facilitates exploration of a phenomenon within its context using a variety of data sources" ([Baxter and Jack, 2008](#), p. 544). Bebe Vio is an Italian elite athlete and was chosen and considered as an interesting case because, in our view, she possesses considerable sporting capital (she won two

Paralympic gold medals and other medals in both individual and team sports) and impressive media capital closely linked to her infectious energy and positivity, as well as her generosity (e.g. she founded the non-profit organization Art4sport ONLUS, which gives young amputees the opportunity to participate in sports, provides prostheses and other support services, and launched the Bebe Vio Academy together with Nike). She combines enormous mental strength, a long track record of success in sports (despite her young age), and a significant media presence, particularly in Italy, but also in many other countries. This is evidenced, among other things, by the fact that several multinational companies use her as a global brand ambassador or testimonial. We therefore expected a high level of IC, reflected in all three dimensions of the IC framework for elite athletes examined in this study. To test the IC framework and its applicability to other athletes, we collected primary and secondary data. The primary data was collected using a questionnaire given to Bebe Vio by her father (Ruggero Vio), who is also her manager. We also conducted a telephone interview with him (in two consecutive conversations). To collect the primary data and send the questionnaire, we contacted the non-profit organization Art4sport ONLUS, founded by Bebe Vio. This organization provided us with the contact details of Ruggero Vio, who agreed to answer the questions and act as an intermediary between us and Bebe. The questionnaire was sent by email following our discussions with Ruggero Vio in February 2023.

The questionnaire consisted of three parts. The first part contained contextual questions, i.e. information on victories achieved, supplemented by other sporting successes, Bebe's charitable activities, her main sponsorship and advertising activities, and data from social media, such as the number of followers. The second part of the questionnaire contained tables with the three dimensions (NaC, SpC, and MeC) and the elements of the IC framework used in this study, which were to be completed. Additionally, respondents were asked to rate each element on a scale of 0–10 to capture the perceived importance of each aspect. Finally, the third part of the questionnaire contained questions about Bebe's assessment of missing elements of the IC framework and/or other aspects that significantly contributed to her success and could thus explain her IC. This part also asked whether the different IC dimensions could be ranked according to their relevance to IC development.

We are aware that the use of Bebe's father's responses is a limitation of this study and may have introduced biases. We verified the consistency and accuracy of the information provided using secondary data, including Bebe Vio's books (Vio, 2019, 2021) and sources from social media (e.g. Facebook) and internet (e.g. with reference to Bebe Vio's achievements). Because Ruggero Vio has always cared for Bebe, assuming the roles of father and manager without infringing on her autonomy (for example, as described in Bebe's book (Vio, 2019), she went on a hike with the Girl Scouts as a child without her parents), his knowledge of Bebe Vio can be considered more comprehensive than that of a traditional manager.

#### 4.1 The case: Bebe Vio

Bebe Vio is a wheelchair fencer specializing in the foil discipline, born on March 4, 1997, in Mogliano Veneto. She boasts numerous sporting achievements, beginning with winning the gold medal at the Italian Championships at the age of 15. Her international breakthrough came in 2014 with a second-place finish at both the World Cup and the European Championships. Since 2015, when she turned 18, she has achieved nearly every major victory in her discipline: World Cup winner from 2015 to 2019, European Champion in 2016 and 2018, World Champion in 2015 and 2017, and, most notably, gold medals at the 2016 and 2021 Paralympic Games. She has received prestigious awards such as the title "Cavaliere della Repubblica", the "Collare d'Oro Paralympico", and the "Collare d'Oro", the highest Italian honours. Her fame began even before these successes, as her dream was to participate in the Paralympic Games. At 15, however, she hadn't yet achieved enough athletic success to qualify. Journalist Claudio Arrigoni suggested to her family that she could apply to be a torchbearer for the opening ceremony. To do so, she had to register on the International Paralympic Committee (IPC)

website and receive the most votes (Vienna, 2021). Journalists from a major national daily newspaper (Corriere della Sera) helped her, and the information was spread across various blogs and websites (Vienna, 2015). Her success was described as overwhelming, with more than 1,000 emails sent in support of her application.

Bebe is also known for all the charitable initiatives she and her family have launched, especially the Art4Sport association (Bebe and her parents founded this association with the aim of helping amputee children buy prostheses and sports prostheses and organizing competitions and training activities), and for initiatives to promote the inclusion of athletes with and without disabilities, especially with the “Wembrace Sport” project and the Bebe Vio Academy, which was founded in 2021 with the support of the Nike brand. Although technical sponsors are not widespread in Paralympic sport (Burton *et al.*, 2024) (an aspect also highlighted in the interview with Ruggero Vio), Bebe has several significant sponsors – for some, she is a global ambassador – and she combines these partnerships with social projects (promoting disability sport and inclusion, fostering sustainability through Toyota’s “Beyond 0” project for zero-emission cars, and through collaboration with Sorgenia (an Italian electricity provider) to support green energy and the protection of women). She is also sponsored by L’Oréal, Barilla, Disney, and Unilever. Regarding her social media presence, she is particularly active on Instagram. In total, she has approximately 2 million followers across all platforms where she is present (1,363,768 on Instagram and 655,230 on Facebook, as of June 11, 2025). At the time of the investigation, there was neither a social media manager nor a person responsible for social media. She also performs some institutional duties and has had the opportunity to meet the late Pope Francis, the President of the European Commission, Ursula von der Leyen, the Italian President Mattarella, and the former US President Obama. She has also taken numerous selfies with well-known artists. Despite all these activities, she appears reserved and tries to avoid interviews and gossip. Her popularity seems to stem from her being perceived as a symbol of propriety, energy, vitality, joie de vivre, solidarity, and values such as advocating for the vulnerable, women, and the environment.

## 5. The analysis

### 5.1 *The application of the IC framework of elite athletes on Bebe Vio*

In the following, we apply the IC framework for elite athletes to the case of Bebe Vio. We then report on the assessment of the elements of IC capital in connection with Bebe Vio (NaC, SpC, and MeC). The information required for this was collected using the previously mentioned questionnaire. The questions and answers are summarized in tables and can be found in the [Appendix](#).

Regarding NaC, we posed eight questions on the following topics: innate characteristics, mental strength, talent, passion (an additional element in the IC framework for elite athletes, based on the book by Paralympic athlete Zanardi), technical skills, aesthetic qualities, training activities, and experience. For each element, we asked for an answer specifically related to Bebe Vio’s characteristics and approaches, as well as an indication of its importance on a scale of 0–10. Regarding innate characteristics and mental strength, we also assessed their perceived relevance. This revealed that physical innate characteristics were rated as important at 25%, while mental strength was significantly more relevant to Bebe Vio at 75%. Although this aspect cannot be generalized, it appears particularly important for examining the specific characteristics of Paralympic athletes. All of these aspects are listed in [Table A1](#) in the [Appendix](#).

Regarding SpC, we examined the following dimensions in which it manifests itself with respect to elite athletes: Professional Choices (PC), Technical Choices (TC), Other Aspects (OA), and Results (R).

Thereby, we considered the following topics: Competition Choices (PC), Technical Staff (PC), Professional Management (PC), Training (volume, location, type, etc.) (PC), Coaches (PC), Team Selection (PC), Training Location (TC), Recovery Periods (TC), Lifestyle (OA),

Relationships with Teammates (OA), Victories and Sporting Success (R), and Sporting Success (R) (which is related to the consistency of results achieved). These elements and their corresponding responses are listed in [Table A2](#) in the [Appendix](#). We then examined the MeC dimension, considering the following topics: Reputation, Public Relations, Sponsorship, Relationships with Journalists, Social Media, Popularity, Publications (books and other publications), and Other Activities/Elements. The questions and their corresponding responses are summarized in [Table A3](#) in the [Appendix](#).

To examine the relevance of the IC framework and its content for elite athletes, further specific questions were asked. [Table 1](#) presents the results.

### 5.2 Analysis of the findings

The analysis of the individual dimensions and elements of the IC framework with regard to Bebe Vio suggests that, in terms of NaC, mental strength is the most important characteristic, while innate physical characteristics play a less significant role. This can be explained by the fact that facial disabilities, especially severe ones, require a high degree of mental strength from the affected individual. Such disabilities can diminish many of the innate physical characteristics that distinguish other athletes. Talent is important, but the results underscore that passion and a strong competitive spirit are further crucial elements for sporting success and the development of SpC. Technical skills also play an important role. The intensity of training is of great significance. Aesthetic qualities appear to be essential for developing self-confidence and contribute to the athlete's well-being. Both personally and in interpersonal relationships. The existing literature, e.g. [Zanardi and Gasparini \(2019\)](#), emphasizes the importance of "passion", a parameter added to the tested IC framework for elite athletes. The relevance of this aspect was confirmed by the results of our study.

Regarding the choice of competitions, a very focused approach is evident: Bebe Vio concentrates exclusively on the most important competitions. This may serve to protect the athlete from overexertion and injuries. This focus is similar to that of Usain Bolt ([Aprile et al., 2022](#)) but differs, for example, from Valentina Vezzali, another prominent Italian Olympic fencing champion, who participated in almost all competitions from a young age ([Vio, 2021](#)). For the SpC and its continued development, victories and sporting achievements are of paramount importance. The analysis of the results suggests that three elements are considered the most important:

**Table 1.** Answers to additional IC framework related questions

Question	Answer
<ul style="list-style-type: none"> <li>Are there any other missing dimensions/elements that can be relevant?</li> </ul>	The role of the family and of the team is very important
<ul style="list-style-type: none"> <li>In your opinion, what are the most characteristic elements of the IC framework? In relation to the analyzed dimension</li> </ul>	Extremely sociable. Very competitive
<ul style="list-style-type: none"> <li>Is it possible to identify an evolution in the components of intellectual capital? By reading the books you wrote (<a href="#">Vio, 2019, 2021</a>) and exploring how you participated in the first Olympics as a flag bearer, it would come to mind that "Media Capital" came before Sport Capital. It would be nice to understand your perception of the evolution of the capital dimension</li> </ul>	First phase: natural capital (mental strength); second phase, media capital (which allowed her to participate in the London Olympics as a torchbearer), third phase, sports capital. Natural capital from the age of 3, media capital has been developing since 2012 (London), and sports capital since 2016 (victory at the Olympics)
<ul style="list-style-type: none"> <li>In order of importance, from whom (people and organizations) have you got support (e.g. family, doctors, coach, friends, journalists, other . . .)?</li> </ul>	1 Family, 2 Friends, 3 Medical and Sports Staff, 4 all other teams she belongs, starting from her association

Source: Authors' own work

- (1) The professional manager, in this case the father. This person ensures that the athlete's human needs are also met.
- (2) Training. This is essential for athletic success and consequently occupies a very large part of a professional athlete's life.
- (3) Lifestyle. This aspect is important both for gaining the necessary energy to achieve sporting success (those who are happy and motivated can achieve better results) and for the popularity of Bebe Vio.

The analysis further suggests that Bebe's zest for life, the energy she transmits in her relationships with the people in her team (Bebe uses the term team – in Italian “squadra” – in a broad sense, including friends and all groups she belongs to and participates in) and with other people, as well as all her charitable initiatives, permanently contribute to the development of her media capital. This was confirmed in a recent post supported by Sorgenia – a company promoted by Bebe Vio – and published on June 20, 2025, on Bebe's Facebook page (<https://www.facebook.com/share/p/16Qmfvmhmj/>). In it, Bebe also answered some questions, such as: “What kind of energy do you embody and why?”. Her answer, translated from Italian, was: “Only solar energy, as I take a lot from others and they can recharge me”. Another question was: “Two keywords related to inclusion and disability”. Her answer was: “I say: ‘team’, ‘mutual support’, and ‘fun’”. Her popularity can be described as the sum of all the aforementioned aspects and is further enhanced by their sporting achievements.

The choice of coach, support staff, and teammates—that is, people closely associated with the athlete—is also important and aligns with the literature (e.g. [Rodriguez Macias et al., 2022](#)). As for the MeC, many of its components are closely intertwined. Reputation and popularity play a very important role. They enable Bebe Vio to become a sponsor of major brands. This sets her apart from other athletes and proves that her popularity is not primarily due to sporting achievements.

The analyzed information leads to the conclusion that Bebe possesses an innate talent for public relations. She seems comfortable in the company of others and creates a pleasant atmosphere. Encounters with important figures also contribute to her ever-increasing popularity. Other aspects, such as book publications, contacts with journalists (she very rarely gives interviews), and social media activity, appear to be less important to her. She is actively involved in charitable causes, which has also become her trademark.

## 6. Discussion

The results analyzed in the previous section align with research that has identified media and digital marketing as effective tools for developing the relationship capital of athletes with disabilities. Social networks also represent valuable platforms for these athletes to engage in personal storytelling, build audiences, and strengthen their personal brand ([Abeza et al., 2013](#); [Ballouli and Hutchinson, 2012](#); [Hambrick and Kang, 2015](#); [Parmentier and Fischer, 2012](#); [Su et al., 2020](#)). Furthermore, charitable activities and social support can help expand the athletes' social networks and enhance their social standing ([Kunkel et al., 2020](#)). The importance of these activities for brand building, attracting sponsors, and reaching other (new) target groups can therefore be emphasized.

Based on the analysis, it can be concluded that the three capitals developed in the following order in Bebe Vio's case: First, NaC, as her mental strength and personality enable her not only to overcome difficulties but also to achieve sporting and media success; Second, MeC, as she gained recognition even before her sporting achievements, for example, through her participation in the 2012 London Olympics as a torchbearer, Third, SpC, which plays an important role and supports and continuously develops her MeC.

The study's findings also underscore the important role of family, particularly parents, in Bebe Vio's development. This is related to the fact that living with a disability, especially at a

young age, requires a high degree of parental presence and involvement. This finding aligns with the research of Rouquette *et al.* (2020) and Coates and Howe (2023), which explored the multifaceted role of parents of elite athletes with disabilities, demonstrating how they act as caregivers, managers, coaches, and psychological support providers. Parents, but also close friends, play a pivotal role in coping with the given situation, developing and continuously strengthening self-confidence, and ensuring the availability and mobilization of the necessary energy that is essential for sustained athletic success. The “parents” element was not part of the original IC model. However, it should be considered another important element that complements and completes the other IC dimensions, thus bringing us closer to the idea of determining, or even enabling, the IC of an elite athlete. The influence of parents is also well-known among elite athletes without disabilities; for example, many tennis players are (or were) coached by a parent (Schmid *et al.*, 2015; Wolfenden and Holt, 2005).

Table 2 presents the adapted IC framework based on the results of this study. Newly included aspects are highlighted in bold in the table. The original framework was expanded to include the aspects of “Passion” (assigned to NaC), “Family” (especially parents, assigned to SpC), and “Charitable activities” (added to MeC).

### 7. Conclusions

In this study, we applied the IC framework for elite athletes proposed by Aprile *et al.* (2022) to Bebe Vio, an elite Italian wheelchair fencer. The study contributes to the validation and extension of the proposed IC framework and its components. By applying the framework to an elite athlete with a disability, we were able to demonstrate that the framework is also suitable for determining the IC of other elite athletes. Furthermore, the study was able to refine the framework by incorporating additional parameters. Regarding NaC, the aspect of “passion” was added. With respect to SpC, “family”, and in particular “parents”, emerged as another relevant factor in determining the IC of professional athletes. Regarding MeC, the importance of charitable activities became clear. In this case, these represent the realization of Bebe Vio’s dream of helping other people with disabilities.

**Table 2.** Components of IC framework for elite athletes and paralympic elite athletes

Natural capital (adapted from human capital)	Sports capital (similar to organizational capital)	Mediatic capital (A sort of specific adaptation of relational capital)
<ul style="list-style-type: none"> <li>✓ <i>Natural aspects</i></li> <li>- Native characteristics</li> <li>- Mental strength/fragility</li> <li>- Talent</li> <li>- <i>Passion</i></li> <li>- Technical skills</li> <li>- Aesthetic qualities</li> <li>✓ <i>Improving elements</i></li> <li>- Training activities</li> <li>- Experience</li> </ul>	<ul style="list-style-type: none"> <li>✓ <i>Professional choices</i></li> <li>✓ <i>Technical choices</i></li> <li>✓ <i>Other aspects</i></li> <li>✓ <i>Results</i></li> <li>- Choice of competitions</li> <li>- Technical staff</li> <li>- Professional management</li> <li>- Training (place, type, etc.)</li> <li>- Coach</li> <li>- Team selection</li> <li>- Place of training</li> <li>- Rest period</li> <li>- Lifestyle</li> <li>- Relationships with teammates</li> <li>- <i>Family (in particular parents)</i></li> <li>- Wins</li> <li>- Sport success</li> </ul>	<ul style="list-style-type: none"> <li>✓ <i>Natural aspects</i></li> <li>✓ <i>Professional choices</i></li> <li>✓ <i>Other Aspects</i></li> <li>- Reputation</li> <li>- Public relations</li> <li>- Sponsors (<i>technical and others</i>)</li> <li>- Relationships with journalists</li> <li>- Social media</li> <li>- Media exposition</li> <li>- Popularity</li> <li>- Sympathetic</li> <li>- Empathy</li> <li>- Charisma</li> <li>- <i>Charitable activities</i></li> <li>- Looks</li> <li>- Gossip</li> </ul>

Source(s): Authors’ own work

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We are aware that, despite its advantages for gaining knowledge, a single case study alone is insufficient, and that further research is needed to develop the framework into a generic IC framework for elite athletes. As already mentioned in the methodology section, the chosen methodological approach, despite the triangulation of different data sources, may have led to possible biases which could represent a limitation.

Nevertheless, we consider this study an important and relevant contribution to the further development of the IC framework. In our opinion, this study has contributed to a better understanding of the IC framework and its usefulness for determining the intellectual capital of individuals (in this case, professional athletes). By extending the scope of investigation to a different type of elite athlete, it was demonstrated that the IC framework is suitable also for elite athletes with disabilities. The results of this study have clarified that the three proposed capital dimensions of the original framework are relevant and appropriate for identifying the IC of individuals. Thus, a relevant set of capital dimensions appears to have been developed that complements the traditional IC dimensions focused on companies or countries and further develops existing IC research (Alppivuori and Kianto, 2025), especially research in the field of IC frameworks and different dimensions (Amitrano *et al.*, 2025; Ferenhof *et al.*, 2015). The latter benefits from studies like the present one, as it is now better possible to determine IC of different subjects and objects, taking into account their respective properties. We see the IC framework as a practical and easy-to-use tool for both aspiring and established elite athletes and their support teams to determine how and whether their efforts and commitments create not only intangible but also monetary value. Given the limited timeframe of an active athletic career, such insights should be highly relevant.

By studying athletes with disabilities, we have also focused on a societal group that continues to be neglected, particularly in economic and management research. However, the results of our work suggest that this is unjustified and limits our knowledge and explanatory power regarding various phenomena from different perspectives.

We hope that this study will stimulate further research aimed at testing and developing the refined IC framework for elite athletes using different methods and samples. Comparative studies building on the results of this study and considering different national contexts and sports would be particularly interesting in this regard. Focus groups composed of professional athletes could also be used for further testing of the framework and its elements.

(The Appendix follows overleaf)

**Table A1.** Assessment of the elements of Bebe Vio's Natural Capital

Natural capital elements	Bebe Vio	Degree of importance (0–10)
Native characteristics	Physically, she is not particularly structured and not very fast but shows a great resistance to pain	3 (25% of importance)
Mental strength	Very high mental strength Great concentration and extreme competitiveness	10 (75% of importance)
Talent	Passion and extreme competitiveness	9
Passion	Strong passion	10
Technical skills	She has learnt to breathe. Attacking a lot and being very tiring given the disabilities, it was necessary to learn to breathe. Necessary for long meetings. She has great ability to adapt, both to the rules (she learnt to fight without being able to hold onto the wheelchair with her hands, and to adapt to the opponent. She once fought with a right prosthesis, despite being left-handed, as the two prostheses left were both broken	8
Aesthetic qualities	Beautiful and at ease with and without prosthetics and with scars. Great self-esteem. She is self-confident, which helps her to relate to everyone	8
Training activities	6/8 h per day. Relevant sports techniques	9
Experience	She has learnt to adapt to her opponents and change her way of fighting	6

**Source(s):** Authors' own work

**Table A2.** Assessment of the elements of Bebe Vio's Sports Capital

Sports capital elements	Bebe Vio	Degree of importance (0–10)
Competitions choice (PC)	6/7 competitions per year (selective approach) with the exception when she is injured World Cup: 5 competitions Participation to European Championship and World Championship (they alternate every year) Paralympic competitions (in general, every 4 years, with the exception of 2021) National Championship (not Italian Cup) Few competitions for charity reasons	4
Technical staff (PC)	Doctor, trainers and also photographer. It can include other persons	9
Professional management (PC)	Her Father. It is important since he works for her joy and safeguard and not for collecting money (the opposite of a greedy approach)	10
Training (quantity, place, type, etc.) (PC)	In Rome, where she lives, but also in other places. Physical and technical training	10
Coach (PC)	Personal coach and one of the Italian National Team	9
Team selection (PC)	She belongs to the sports group "Fiamme Oro" (Italian Police). Summoned by the Italian National Team	6
Place of training (TC)	Roma, where she lives	4
Rest period (TC)	2 weeks in summer and 1 week for Christmas	4

*(continued)*

**Table A2.** Continued

Sports capital elements	Bebe Vio	Degree of importance (0–10)
Lifestyle (OA)	Sociable, dynamic, full of journeys and experiences, sporty and carefree	10
Relationships with teammates (OA)	Fantastic and generous. She always shares victories and makes them feel like victories of her whole team. She also relates to her Olympic and Paralympic fencing colleagues	9
Wins and sports success (R)	Main victories and results (competition for disables): Italian paralympic championship 2012 Italian paralympic championship 2013 European Championship 2014 Team European Championship 2014 World Championship 2015 European Championship 2016 Paralympic Games 2016 Bronze team Paralympic Games 2016 World Championship 2017 Team World Championship 2017 European Championship 2018 Injury 2019 European Championship 2019 World Championship 2019 Injury 2020 Paralympic Games 2021 Injury 2022 Started training again February 2023 European Championship 2023 Bronze medal Paralympic Games 2024 Team Bronze medal Paralympic Games 2024	10
Sport success (R)	Continuous	10

**Source(s):** Authors' own work

**Table A3.** Assessment of the elements of Bebe Vio's Media Capital

Media capital elements	Bebe Vio	Degree of importance (0–10)
Reputation	Symbol of correctness, energy, vitality, passion for life, solidarity, and other values (defence of the weakest, women, and the environment). Lots of charity	10
Public relations	Comfortable with everyone. As a little girl, many selfies with famous people (artists, singers . . .) and key institutional leaders With the previous Pope, with the Italian President, with EU President Von der Leyen, with former US President Obama etc. Equal relationships with everyone, from the children who help with the Association, to teammates, friends, to the highest representatives of the institutions	10
Sponsor	Few projects. Global ambassadors. Faithful over time. Since 2017, national and international sponsors (e.g. Barilla, Toyota, Nike, L'Oréal, Sorigenia). Disney, Unilever She is the Ambassador of the Milan-Cortina 2026 Winter Olympics	10

*(continued)*

**Table A3.** Continued

Media capital elements	Bebe Vio	Degree of importance (0–10)
Relationships with journalists	Excellent, even if she is very selective and in recent years refuses almost all interviews	6
Social media	Not particularly active (2/3 posts per month). The main one is Instagram, used directly by her. Adding up all social networks, it has about 2,000,000 followers She doesn't have a Media Manager	7
Popularity	Her popularity begins at the national level, but she is also known in many other countries of the world. Such a situation is very useful for carrying out charity projects and promoting sports for the disabled and the Paralympic Games She also participated in the inauguration of the Olympic Games in Paris (2024)	10
Published Books and other publications	2 books plus others inspired by her. Uno is an Italian best seller with more than 25,000 copies. She usually doesn't make presentations	5
Other activities/elements	Lots of charity. In particular, through the Art4sport association, which gives prostheses to disabled children and young people and helps them to integrate both at a sporting and social level. Promote inclusion. She is involved in motivational projects (prisons, but also companies and institutions)	8

**Source(s):** Authors' own work

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